A NEW GENUS OF THE BRYOZOAN FAMILY ELECTRIDAE, WITH A PLECTRIFORM APPARATUS

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A new bryozoan genus, *Mychoplectra* (type species *Lepralia pocula* Hutton), is established for two southern Australian species of Electridae with a spurred, scoop-like plectriform apparatus. These species were formerly placed in *Pyripora*, which lacks such an apparatus. It is shown that *M. pocula* is not conspecific with *Cellepora alata* Lamouroux, which is a species of *Diploporella* (Thalamoporellidae). *Mychoplectra pocula* is a protogynous hermaphrodite.

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The electrid bryozoan genus *Pyripora* d'Orbigny, 1849 is best known by the north-eastern Atlantic Recent species *P. catenularia* (Fleming). This species, like a number of related fossils including the type species *P. pyriformis* (Michelin), forms encrusting branching chains of simple pyriform zooids, each of which has a proximal gymnocyst and a coextensive membranous frontal wall with a narrow granular cryptocyst bordering the opesia. As is typical of electrids, there are no avicularia or ovicells. As Taylor (1986) has remarked, the absence of ovicells in these species suggests that the larva is of the planktotrophic cyphonautes type, though none has yet been recognized.

Three species of *Pyripora* have been reported from the southern coast of Australia: *P. polita* (Hincks, 1880), *P. crassa* (MacGillivray, 1869) and *P. catenularia* (Fleming, 1828). *Pyripora polita* (=*Lepralia pocula* Hutton, 1878, see below) is a common encruster of sea-grass stems and has been illustrated by scanning electron microscopy [Bock 1982, fig. 9.7(c)]. *P. crassa* and Australian *P. catenularia* have to date been little-known.

During an examination and subsequent taxonomic revision of F. W. Hutton's collection of South Australian bryozoans in the Otago Museum, New Zealand (Gordon & Parker 1991b), skeletal structures were discovered in *"P. pocula* that clearly affected its generic placement. This finding led to an investigation of all three putative Australian species of *Pyripora*. The skeletal structures constitute the plectriform apparatus (Gordon & Parker 1991a), an internal elaboration of the gymnocyst, which occurs in several species of malacostegine bryozoans. It does not occur in the type species of *Pyripora* (*P. pyriformis*), however, and a new genus is required for the Australian species.

SYSTEMATICS

Mychoplectra gen. nov.

Diagnosis

Colony encrusting, uniserial to multiserial. Zooids generally pyriform, with extensive proximal gymnocyst and narrow granular cryptocyst. Kenozooids present. Plectriform apparatus present. Articulated spines, avicularia and ovicells absent. Embryos numerous, non-brooded. Simple uniporous septula present.

Etymology

Mychoplectra, f., formed from Gk *mychos*, inmost part, recess, and *plektron*, spur. Although *plektron* is a neuter noun, *Mychoplectra* is here introduced as feminine in gender [see the International Code of Zoological Nomenclature, Article 30(a) (iv) (Ride *et al.* 1985: 58–59)].

Type species

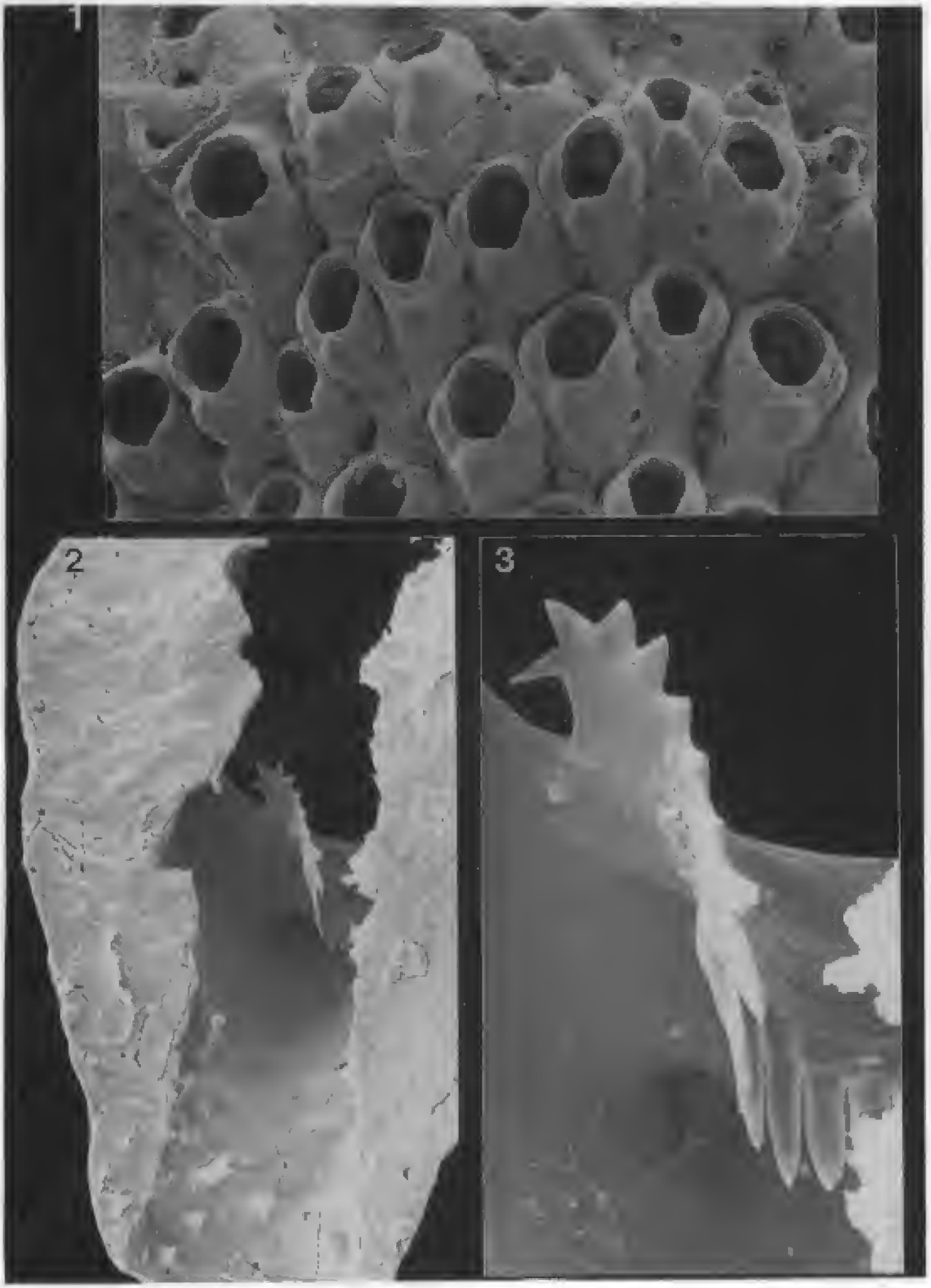
Lepralia pocula Hutton, 1878.

Mychoplectra pocula (Hutton) (Figs 1–4)

Lepralia pocula Hutton, 1878: 24; Jelly 1889: 132.
Membranipora polita Hincks, 1880: 377; MacGillivray 1882: 118; Jelly 1889: 161.
Pyripora polita: MacGillivray *in* McCoy 1885: 24; 1887: 205; 1890: 2; Vigeland 1964: 169; Bock 1982: 343.

Material examined (localities all in South Australia)

South Australian Museum. Vials: SAM L475, 476, off Seacliff, Adelaide district, Gulf St Vincent, 11 m, coll. S. A. Shepherd, 28 Sept. 1968; L477, Port Elliot, Encounter Bay, undated; L490, no data. Slides: L189a,



FIGURES 1–3. *Mychoplectra poculo* (Hutton): 1, colony on shell of turritellid gastropod (SAM L490, no locality). × 40; 2 and 3, view of plectriform apparatus from within the zooid (paralectotype, OM A.88.160B, Gulf St Vincent, South Australia), × 275, × 890.

off Adelaide, 20–35 fms [37–64 m], coll. J. C. Verco, undated; L479–481, Glenelg, Adelaide, undated; L482, 'S. Aust.', undated. Spirit specimens: L483, West I., Encounter Bay, 3–5 m, coll. N. Holmes, 8 July 1988; L484, just E of The Bluff, Encounter Bay, upper subtidal, coll. K. L. Gowlett-Holmes and S. A. Parker, 18 July 1988; L488, Edithburgh, Yorke Peninsula, upper subtidal, coll. P. Hudson, 24–28 April 1989; L491, Port Victoria jetty, Yorke Peninsula, 1–2 m, coll. K. L. Gowlett-Holmes, 25 July 1989; L499, 5 Nm NW of Outer Harbor, Adelaide district, coll. N. Holmes, 7 Nov. 1989.

Otago Museum. Vials: OM A.88.160A, B, shores of Gulf St Vincent, coll. R. Tate (lectotype and paralectotype of *Lepralia pocula* Hutton).

N.Z. Oceanographic Institute. Vial: Stn Z6722, just E of the Bluff, Encounter Bay, upper subtidal, coll. S. A. Parker and T. Sim, 10 Feb. 1989.

Substrates

SAM L477 and L482 were on algae, L490 on a turritellid gastropod, and the remainder on stems of the sea-grasses *Amphibolis antarctica* and *A. griffithii*.

Description

Colony encrusting, pluriserial, with short uniserial runners distally that also become pluriserial as the colony expands. Colour in life pearly white, often with a pinkish tinge from thinly encrusting and/or endozoic red algae. Zooids 0.32–0.64 × 0.17–0.32 mm, elongate-pyriform, often occurring in oblique rows depending on the substratum. Frontal surface a smooth, porcellaneous gymnocyst, sometimes with transverse growth-check lines proximally, that surrounds the variably subpyriform/suboval sunken opesia; frontal membrane set at angle of *ca* 20–45° to the plane of the substratum; gymnocyst with 3 large rounded eminences bordering the opesia, 2 lateral, with a larger swelling at the highest part of the frontal wall that overhangs the proximal part of the opesia and frontal membrane; the underside of the gymnocystal overhang with a prickled surface. Cryptocyst narrow, vertical, rarely shelf-like, not or scarcely developed proximally, with no or sparse granulations. Avicularia absent. Kenozooids present interzooidally (depending on crowding of zooids), with a variably shaped membranous area. Plectriform apparatus comprising a median scoop proximally recurved with distal teeth, and a pair of lateral spurs which may project into the opesia. Additional tiny spurs may protrude into the body cavity beneath the lateral cryptocyst. Calcareous spinous processes also arise from the inner side of the frontal gymnocyst proximally, projecting into the coelom. Generally 1–2 openings of narrow intramural basal pore-chambers present frontally. Polypide with 12 tentacles. No ovicells; zooids protogynous hermaphrodites, producing numerous non-brooded embryos. Ancestrula unknown.

Remarks

Mychoplectra is established for this species and for '*Pyripora*' *crassa*, both of which are characterized by a plectriform apparatus. Like *Pyripora*, *Mychoplectra* has a well-developed gymnocyst, a partial cryptocyst, extensive area of membranous frontal wall, and kenozooids. Both genera lack oral or mural spines, avicularia, and ovicells. Whereas Recent *Pyripora* have discrete basal pore-chambers with a septular wall (these details unknown for the fossil type species), *Mychoplectra* has small tubular intramural chambers, comparable to those in *Hippothoa divaricata* (see Gordon & Hastings 1979, fig. 2, C), with a tiny uniporous septulum.

The earliest available name for the type species is *Lepralia pocula* Hutton, 1878, described without illustration, and subsequently overlooked. Recently, Hutton's collection from South Australia was discovered in the Otago Museum, Dunedin (Gordon & Parker 1991b). His specimens of *Lepralia pocula* were formally registered and a lectotype (A.88.160A) designated from the syntypes. It is not inconceivable that instead of *pocula* Hutton had meant to write the substantival form *poculum*. Even if this had been so, however, the spelling cannot now be corrected to *poculum*; for, there is in Hutton's original description no clear internal evidence of an inadvertent error, and no indication that *poculum* is the correct substantival form [see the International Code of Zoological Nomenclature, Article 32(*c*) (*ii*) (Ride *et al.* 1985: 68–69)]. We therefore suggest that *pocula* be retained, and treated as adjectival in form.

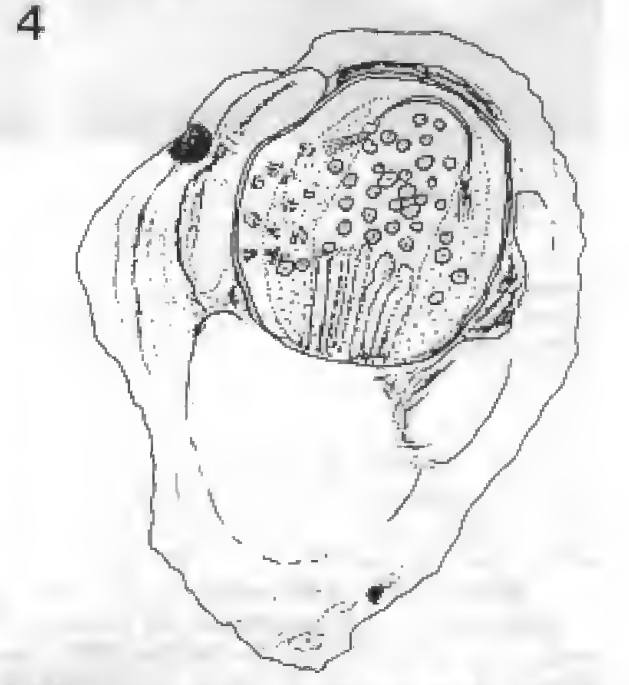
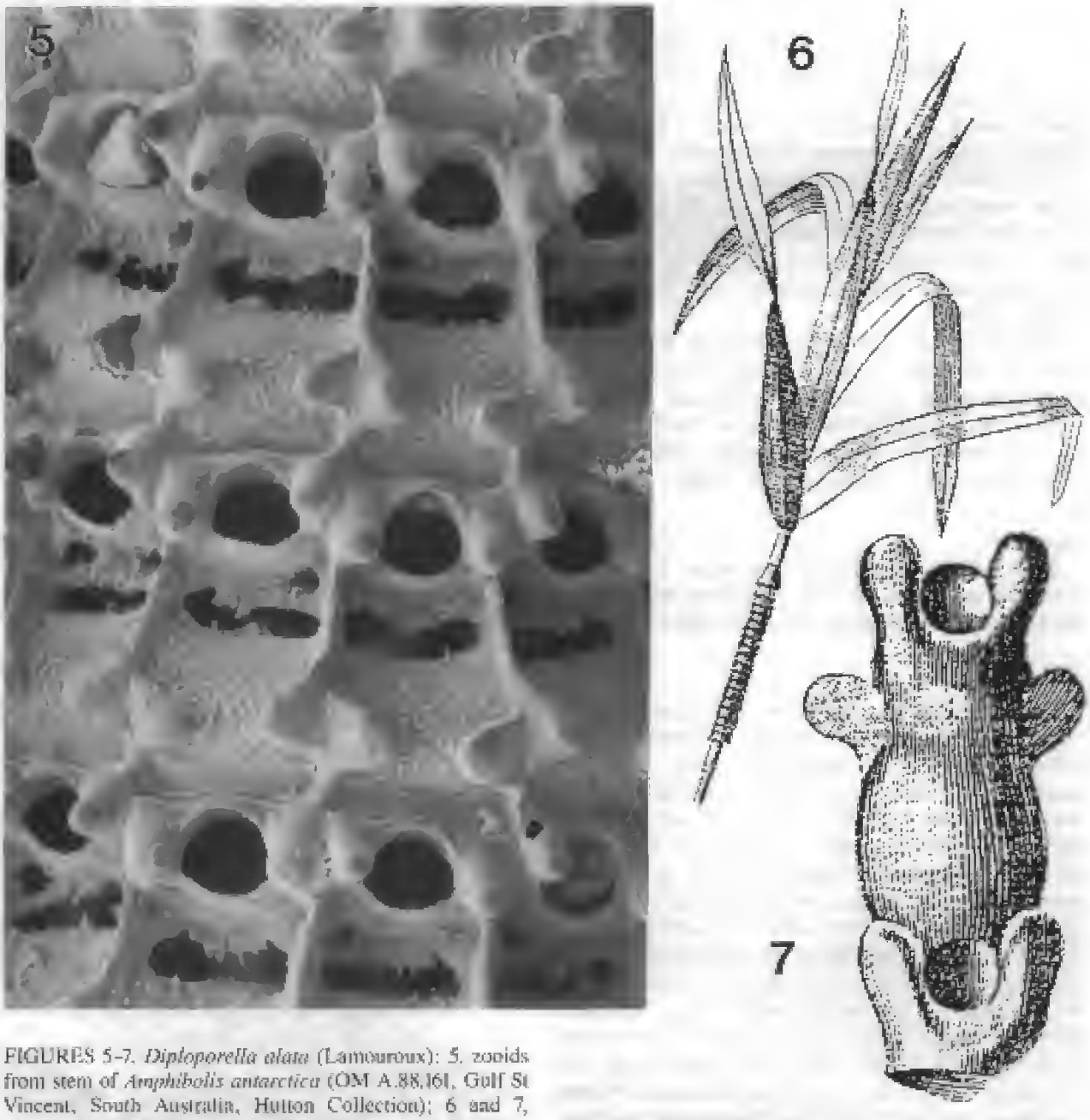


FIGURE 4. *Mychoplectra pocula* (Hutton): single zooid, with testes (left-hand side) and oocytes visible under the frontal membrane (NZOI Stn Z6722, near Victor Harbor, South Australia, from colony on stem of *Amphibolis antarctica*), × 105.



FIGURES 5–7. *Diploporella alata* (Lamouroux): 5, zooids from stem of *Amphibolis antarctica* (OM A.88.161, Gulf St Vincent, South Australia, Hutton Collection); 6 and 7, Lamouroux's (1821) illustrations of *Cellepora alata* on type material of *Amphibolis antarctica* from Esperance Bay, Western Australia.

In his account of Hincks' (1880) species *Membranipora polita*, MacGillivray (1882) commented that it probably ought to form the type species of a new genus, to include also *Hippothoa crassa* MacGillivray, 1869. While prescient, this was in contradistinction to *Membranipora*, not *Pyripora*, in which genus MacGillivray (*in* McCoy 1885) later included *M. polita*, and *H. crassa*. Concerning *M. polita* MacGillivray (1882) also stated, 'I have little doubt that it is identical with Lamouroux's *Cellepora alata*.' He repeated this assertion in McCoy (1885), in which he transferred the species to *Pyripora*. Jelly (1889), following MacGillivray, tentatively listed Lamouroux's (1821) species with *M. polita*. MacGillivray was in error, however. As suggested by Harmer (1926: 289), *Cellepora alata* is a senior synonym of the species currently known as *Diploporella cincta* (Hutton), formerly *Thairopora cincta* (Fig. 5) (see Soule *et al.* 1991). Both *Mychoplectra pocula* and *D. cincta* encrust stems of the cymodoceacean seagrasses *Amphibolis antarctica* and *A. griffithii* along the southern Australian coast. Lamouroux (1821, pl. 64, figs 10, 11) illustrated part of a leafy stem of *A. antarctica*, reproduced here (Fig. 4), showing zooids and a colony of an encrusting bryozoan (Figs 6, 7). *Mychoplectra pocula* and *Diploporella cincta* are two of only three bryozoan species [the other being *Electra flagellum* (MacGillivray)] to form regularly whorled zooidal rows

on *Amphibolis*, but Lamouroux's illustration cannot be of *Mychoplectra*, for the latter produces only oblique whorls, not regularly transverse ones (verticillate) as depicted by Lamouroux. Lamouroux's illustration of the zooids confusingly fails to show the cryptocyst of *D. cincta* but his description (1821: 2) makes it clear. He describes the zooids as '*gibbeuses inférieurement, avec deux appendices ptéroïdes sur leur parties moyenne et latérale; ouverture ronde avec un tubercule très-gros et mamilliforme de chaque côté*.' This is a description of zooids with the membranous frontal wall intact. The wing-like appendages correspond to the pair of smooth gymnocystal flaps, which encroach onto the convex cryptocyst; the mamilliform tubercles occur on either side of the subcircular orifice (Fig. 5). As Harmer (1926: 289) suspected, therefore, *Diplosporella alata* (Lamouroux, 1821) is the correct name for this species. The type locality is Esperance Bay, Western Australia (Womersley 1984: 104). The type specimen would be on type material of *Amphibolis antarctica*, evidently housed at the Herbarium Universitatis Florentinae, Florence, Italy, but upon enquiry, the latter has been unable to be located.

Mychoplectra crassa (MacGillivray)
(Figs 8–10)

Hippothoa crassa MacGillivray, 1869: 130.
Pyripora crassa: MacGillivray *in* McCoy 1885: 23; 1887: 205; Vigeland 1964: 169.
Pyripora catenularia: MacGillivray (*non* Fleming) *in* McCoy 1885: 24, pl. 106, fig. 5; 1887: 205; Vigeland 1964: 169.

Material examined

South Australian Museum. Vials: L189b, off Adelaide, Gulf St Vincent, 20–35 fms [37–64 m], coll. J. C. Verco (undated); L485, Chiton Rocks near Victor Harbor, Encounter Bay, coll. L. Stach, 20 Nov. 1936; L486, Kangaroo I., no other data; L487, S. Aust., no other data; L489, between Backstairs Passage and The Pages, coll. J. C. Verco (undated); L500, Shell Rock, West I., Encounter Bay, coll. S. A. Shepherd, 18–19 Aug. 1967; L502, Price I., southern Eyre Peninsula, 17 m, coll. L. Hobbs, 28 Sept. 1989. Spirit: The Pages (islets), Kangaroo I., 15 fms [27.5 m], coll. K. Sheard, 12 April 1941.

Museum of Victoria. Slides (both labelled *Pyripora catenularia*): NMV F58646, Port Phillip Heads, Victoria, coll. J. B. Wilson; NMV F58647, Hobsons Bay, Victoria (no other details).

Substrates

L189b, L485–487 on red algae (including *Pterocladia lucida*); L489 on adeonid bryozoan (with *Turbicellepora reduuvi*); L498 on stalk of brachiopod *Magellania flavescens*; L500 on hydroid; L502 on flat rounded pebble; F58646 on stem of ?hydroid; F58647 on angular pebble.

Description

Colony encrusting, uniserial, branching more or less cruciform, to pluriserial. Zooids 0.23–0.64 × 0.14–0.42 mm, elongate-pyriform, the proximal caudal portion short, truncated in laterally budded zooids, longer and tapering in distally budded zooids. Frontal gymnocyst smooth, sometimes with a thick porcellaneous protuberance immediately proximal to the membranous frontal wall; cryptocyst shelf-like, moderately developed, widest proximally, pustulose; frontal membrane set at shallower angles to substratum than in *M. pocula* (0–25°). Avicularia absent. Kenozooids may be present interzooidally, replacing autozooids at distolateral budding sites when crowding occurs, the opesia irregularly circular to oval. Plectriform apparatus similar to that in *M. pocula* but the distal spurs of the apparatus tend to be more often visible, with at least one protruding somewhat into the opesial space; tiny spur-like spines may occur sparsely on the lateral walls. Internal nail-like spines occur proximally under the gymnocyst. Small intramural basal pore-chambers present, up to 2 per side but the proximal pair may be suppressed. No ovicells. Ancestrula unknown.

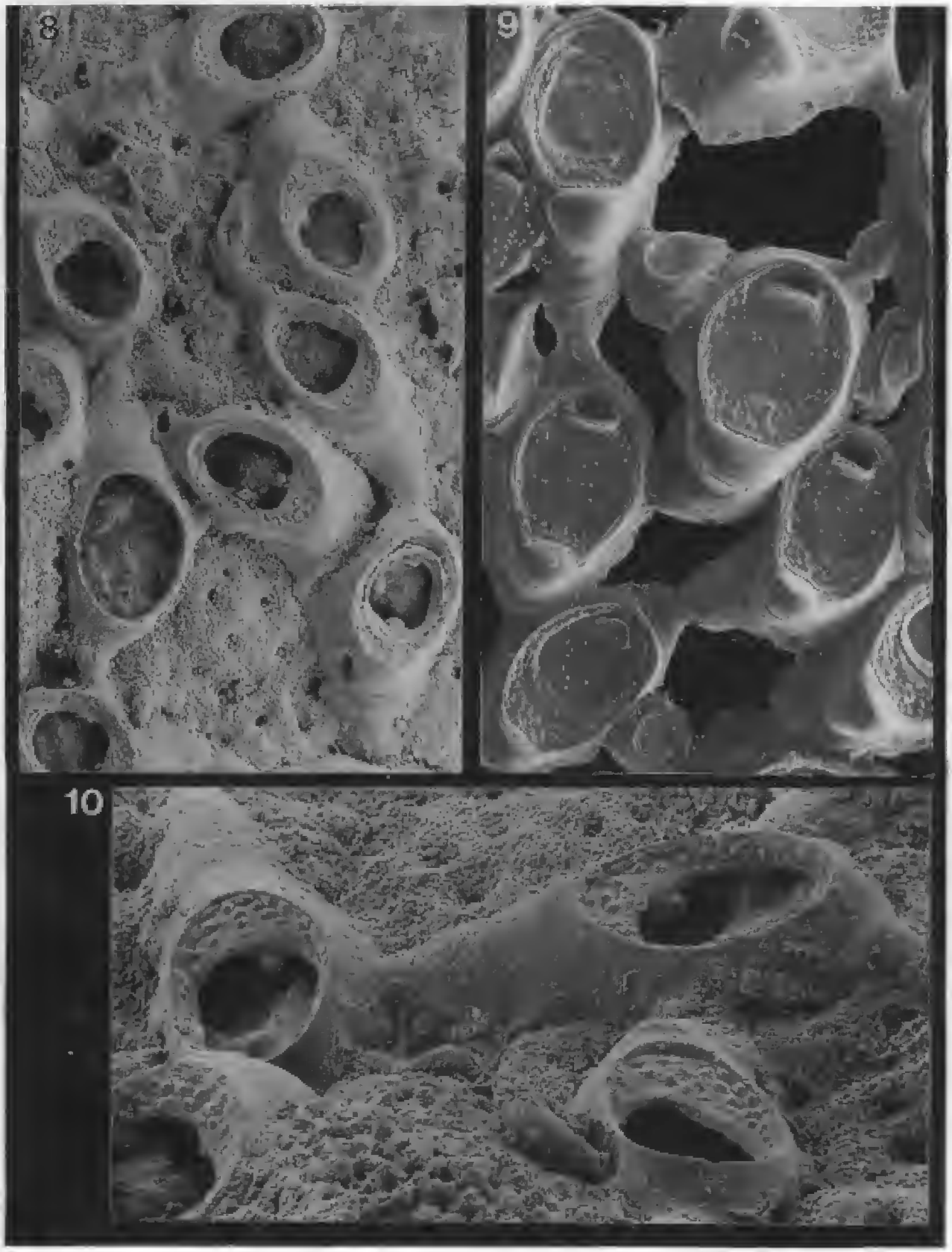
Remarks

Two types of zooids were evident in the colonies of *M. crassa* examined:

a) (Fig. 9) zooids possessing a protuberance on the gymnocyst proximal to the frontal membrane [corresponding to the 'thick lip-like projection' of MacGillivray (1869), MacGillivray *in* McCoy (1885)], the protuberance sometimes bearing a pit-like depression apparently covered with a membrane; some zooids showing additional gymnocystal thickening on the proximolateral margins of the opesia, though this thickening not encroaching over the frontal membrane as in *M. pocula*.
b) (Figs 8, 10) zooids lacking gymnocystal protuberances and thickenings, and outwardly resembling *Pyripora catenularia* (Fleming).

Type 'a' occurred in the colonies on the relatively flexible substrates (fronds and stems of red algae, hydroids and brachiopod stalk). Type 'b' occurred on the harder substrates (L489, adeonid bryozoan, and L502 and F58647, pebbles). In addition, colony L502 has many Type 'a' zooids and zooids intermediate between the two types, which leads us to regard them as expressions of the one species, *M. crassa*, rather than as representing different species.

Through the courtesy of Mr T. Stranks of the Museum of Victoria, we have been able to examine on loan two of the slides identified by MacGillivray as



FIGURES 8–10. *Mychoplectra crassa* (MacGillivray): 8 and 10, colony on adeonid bryozoan (SAM L489, between Backstairs Passage and The Pages, South Australia) × 80, × 115; 9, colony on red alga (*?Pterocladia lucida*) (SAM L485, Chiton Rocks, Encounter Bay, South Australia), × 170.

Pyripora catenularia (FS8646, 58647, listed above). These colonies are both referable to *M. crassa*, the first having zooids of Type 'a', the second zooids of Type 'b'. MacGillivray's figure (in McCoy 1885) is also of type 'b', which differs from true *Pyripora catenularia* (Fleming 1828) of the north-eastern Atlantic Ocean by the possession of the plectriform apparatus, the proportionately larger cryptocyst and the beading of the mural rim less distinct to absent. Scanning electron micrographs of *P. catenularia* have been published in Taylor (1986).

Recent species of *Pyripora* appear to be restricted to the Northern Hemisphere (Ryland & Hayward 1977; Canu & Bassler 1929). *Mychoplectra*, on the other hand, is so far known only from the Southern Hemisphere. *Pyripora audens* Marcus, 1949 of Brazil is certainly a *Mychoplectra*, and from its external morphology *Membranipora eburnea* Hincks, 1891 (type locality '? Queensland') may also be congeneric.

Apart from the type species *P. pyriformis*, several other fossil species have been ascribed to *Pyripora* (*e.g.* by Canu & Bassler 1920; Thomas & Larwood 1956, 1960; Larwood 1973; Voigt 1982) and it would be instructive to examine the interior walls of these for a plectriform apparatus, which in *Mychoplectra pocula* appears to be a guide for the movements of the polypide (Gordon & Parker 1991a).

Reproduction

Details of reproduction in *Pyripora* are not known, though it is suspected of having a cyphonautes-type larva. In *Mychoplectra*, the only breeding information pertains to *M. pocula*. In South Australian waters, gonads are evident in colonies collected in February, and colonies have been found spawning in February, July and November. Testes and apparently mature oocytes occur in the same zooids. Oocytes are spherical, approximately 0.01 mm in diameter, and in living material are brownish-red and set in a clear gelatinous matrix; *ca* 30 or more are evenly distributed under the membranous part of the frontal wall.

The timing of maturation of gametes varies in electrids. *Electra pilosa* and *E. posidoniae* tend to be protandrous whereas in *E. crustulenta* male and female gametes mature simultaneously (Silén 1966). Up to 20 ova are produced by *E. posidoniae* (Silén 1966) and a much larger number by the membraniporid *Membranipora membranacea* (39 are illustrated) (Silen 1945). The cyphonautes larvae of these species have been illustrated by Ranzoli (1963) and Ryland (1964, 1965). A cyphonautes larva is presumed for *Mychoplectra*. Plankton-sweeps over *Amphiblolis* beds around times of egg-release might reveal the larval form of *M. pocula*.

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